
# Insights on Renewable Energy Project Finance

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**Modeling New Renewable Project Financing – ECAI Web Forum**

**January 30, 2008**


# Overview

- Risk versus Return
- Assessing Risk and Return
- Risk and Return in Energy Finance
- Wind, Solar, and Biomass
- Geothermal, Hydoelectric
- Summary


# Risk and Return

- **The Basic Adage**
  - The greater the risk, the greater the rate of return required
- **Corollary**
  - If risk exceeds rate of return then you won't get any money


# Basic Energy Project Finance

- **Project purports a certain level of revenue and costs**
  - **Proforma with agreed upon performance criteria to be met**
- **Project demonstrates conformity with a standard level of risk for its category relative to the potential source of financing.**
  - Team of lawyers, accountants, scientists and engineers on each side exchange information
  - Outstanding items allow financier to increase costs up to a threshold where the financier can exit transaction


# Basic Energy Project Development

- Project concept, location and rough design
- Permits and purchase contracts obtained while detail design developed
- **Financing** secured
- Construction
- Operation


# Assessing Risk and Return

- **Risk and Return are not so easily distinguished**
  - Risk on the rate of return itself
  - Risk on the core project's viability
- **Risk and Return are like apples and oranges**
  - Both fruit, but it takes some valuation unique to the assessor to decide their comparative values and find the balance between them
- **Uncertainty is risk; certainty is what eliminates risk. Types of risk/uncertainty:**
  - **Permit and regulatory risk**
  - **Technology and**
  - **Resource supply**
  - **Sales (revenue)**


# Risk and Return in Energy Finance

- The assessment of risk is unique to each type of electrical energy generation technology
  - e.g.: Bio-mass endures a very intense fuel supply scrutiny whereas fuel supply is not a solar energy concept
  - e.g.: Wind endures a wind resource assessment that is fraught with variability whereas geo-thermal is expected to be proved to a particular steady state capability.
- Newer technology inherently is given a greater risk
- For most project types there is a basic, minimum hurdle for risk and return


# Types of Finance

- Balance sheet finance versus project lending or investment
- Recourse lending versus non-recourse lending
- Lending versus investment
- Bonds versus loans versus equity


# Project Risk in General

- Real Estate
- Land Use, Permitting and Governmental Regulation
- Construction
- Operational - Supply  (fuel or energy source)
- Operational – Revenue (production and $ rates
- Litigation, Incident, etc


# Solar Thermal Project Risk and Finance-ability

- Land Use, Permitting and Governmental Regulation
  - Species and habitat issues with large portions of land used
  - Transmission often not nearby
- Construction
  - New technology and companies
- Operations - Supply
  - How much solar energy predicted and actual
- Operations – Revenue
  - Length and terms of power purchase agreement
  - Dependency on federal or state incentives and their predictability to be profitable
- Litigation, Incident, etc
  - Potential Endangered Species Act issues


# Solar PV Project Risk and Finance-ability

- Land Use, Permitting and Governmental Regulation
  - Species and habitat issues with large portions of land used
  - Transmission often not nearby
- Construction
  - New technology and companies
- Operations - Supply
  - How much solar energy predicted and actual
- Operations – Revenue
  - Length and terms of power purchase agreement
  - Dependency on federal or state incentives and their predictability to be profitable (Is not-competitive at all with other renewable sources without significant incentives or subsidy)
- Litigation, Incident, etc
  - Potential Endangered Species Act issues


# Biomass Project Risk and Finance-ability

- Land Use, Permitting and Governmental Regulation
  - Air Quality and BACT
  - CO2 laws
- Operations - Supply
  - Fuel stock availability and reliability
  - Fuel stock and transport cost
- Operations – Revenue
  - Length and terms of power purchase agreement
  - Price versus cost
- Litigation, Incident, etc
  - Emissions (CO2 and pollutants)


# Wind Project Risk and Finance-ability

- Land Use, Permitting and Governmental Regulation
  - Visual, habitat, erosion and avian impacts
  - Transmission
- Operations - Supply
  - Predicted versus actual wind energy production
- Operations – Revenue
  - Length and terms of power purchase agreement
- Litigation, Incident, etc
  - Avian impacts


# Geothermal Project Risk and Finance-ability

- Land Use, Permitting and Governmental Regulation
  - Habitat, groundwater, emissions
  - Transmission
- Operations - Supply
  - Predicted versus actual steam temperature and volumes
  - Durability of geothermal reservoir  (injection?)
- Operations – Revenue
  - Length and terms of power purchase agreement
  - Outages related to steam quality problems